



Joint Advanced Distributed Simulation Joint Test Force (JADS JTF)

Overview Briefing



Outline



- ❑ Background
- ❑ JADS Joint Test & Evaluation
 - System Integration Test (SIT)
 - End-to-End Test (ETE)
 - Electronic Warfare Test (EW)
- ❑ Other Activities
- ❑ Legacy
- ❑ Wrap Up



Background

❑ Problem:

- Shortfalls in traditional testing
- Aggravated by complexity of new systems plus fiscal constraints

❑ “Potential Solution”: ADS/DIS technologies

- Enables you to link real things (live), simulators (virtual), and models/simulations (constructive) together
- Brings more resources, capabilities to your event

❑ Issues:

- Does it work?
- Is it credible?
- How much does it cost?
- How and when should we use it?



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JADS Joint Test & Evaluation

☐ **Chartered on 3 Oct 1994**

- 5 Years
- \$25M Joint Test funding

☐ **Purpose: Determine utility of ADS for**

- Developmental test and evaluation
- Operational test and evaluation

☐ **Tasking**

- Investigate present utility of ADS for T&E
- Identify critical concerns, constraints and methodologies
- Identify T&E related requirements for future ADS systems



JADS Approach

- ☐ **T&E of ADS using representative systems**
- ☐ **Across three “slices” of the T&E spectrum**
 - **System Integration Test**
 - **Flexible missile T&E using AMRAAM & AIM-9**
 - **End-to-End Test**
 - **Integrated C4I T&E using Joint STARS**
 - **Electronic Warfare Test**
 - **Enhanced EW Test Process using ALQ-131**
- ☐ **Form broader conclusions**
 - **Leveraging off other programs**



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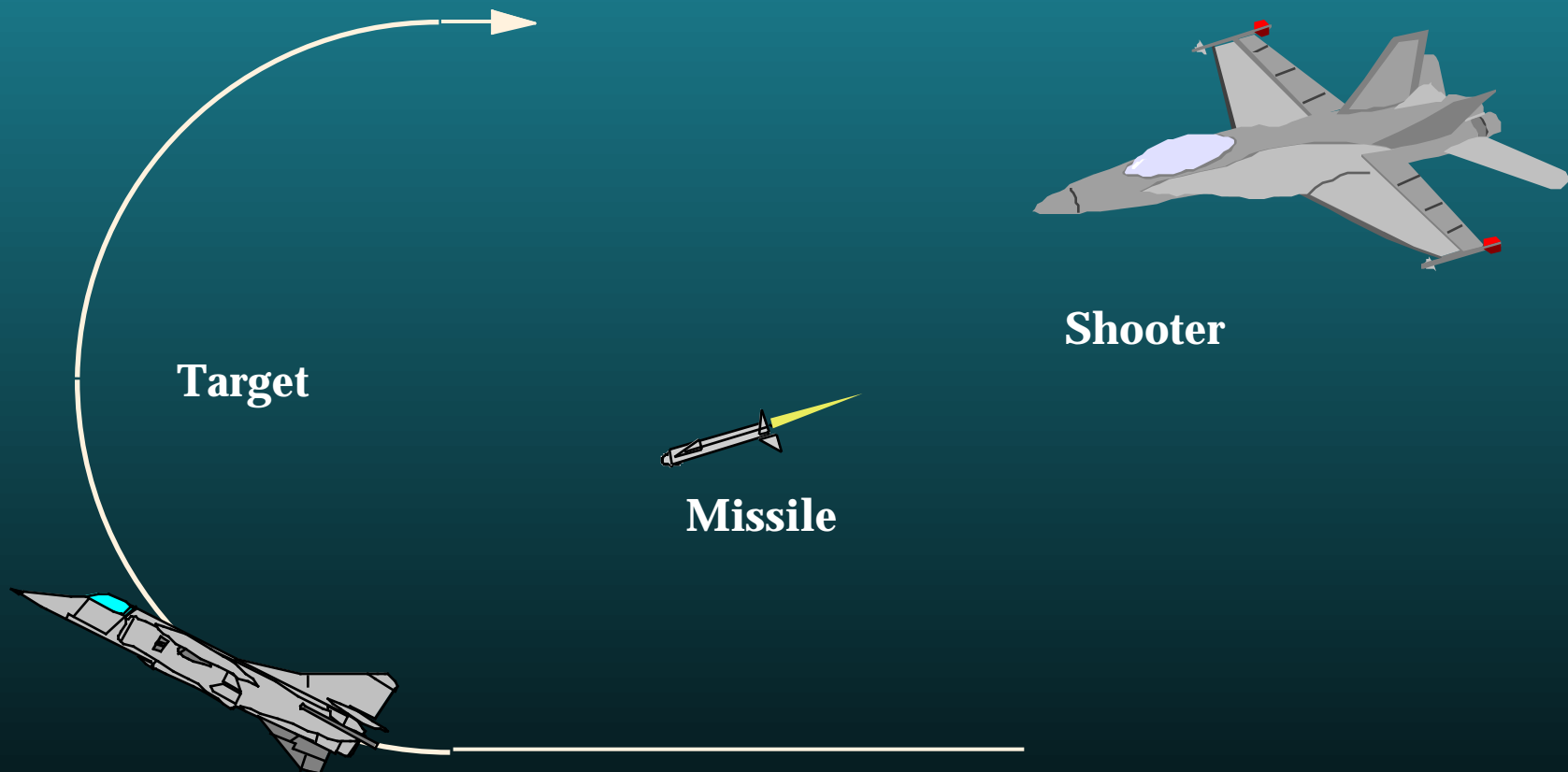


System Integration Test (SIT)

- ❑ **Purpose: Evaluate utility of using ADS to support integrated missile weapon/launch aircraft system testing**
- ❑ **Two Phases**
 - **Linked Simulators (Completed in 1996)**
 - All HWIL simulators
 - AIM-9M missile
 - **Live Fly (1997)**
 - Live aircraft and HWIL missile simulator
 - AMRAAM missile

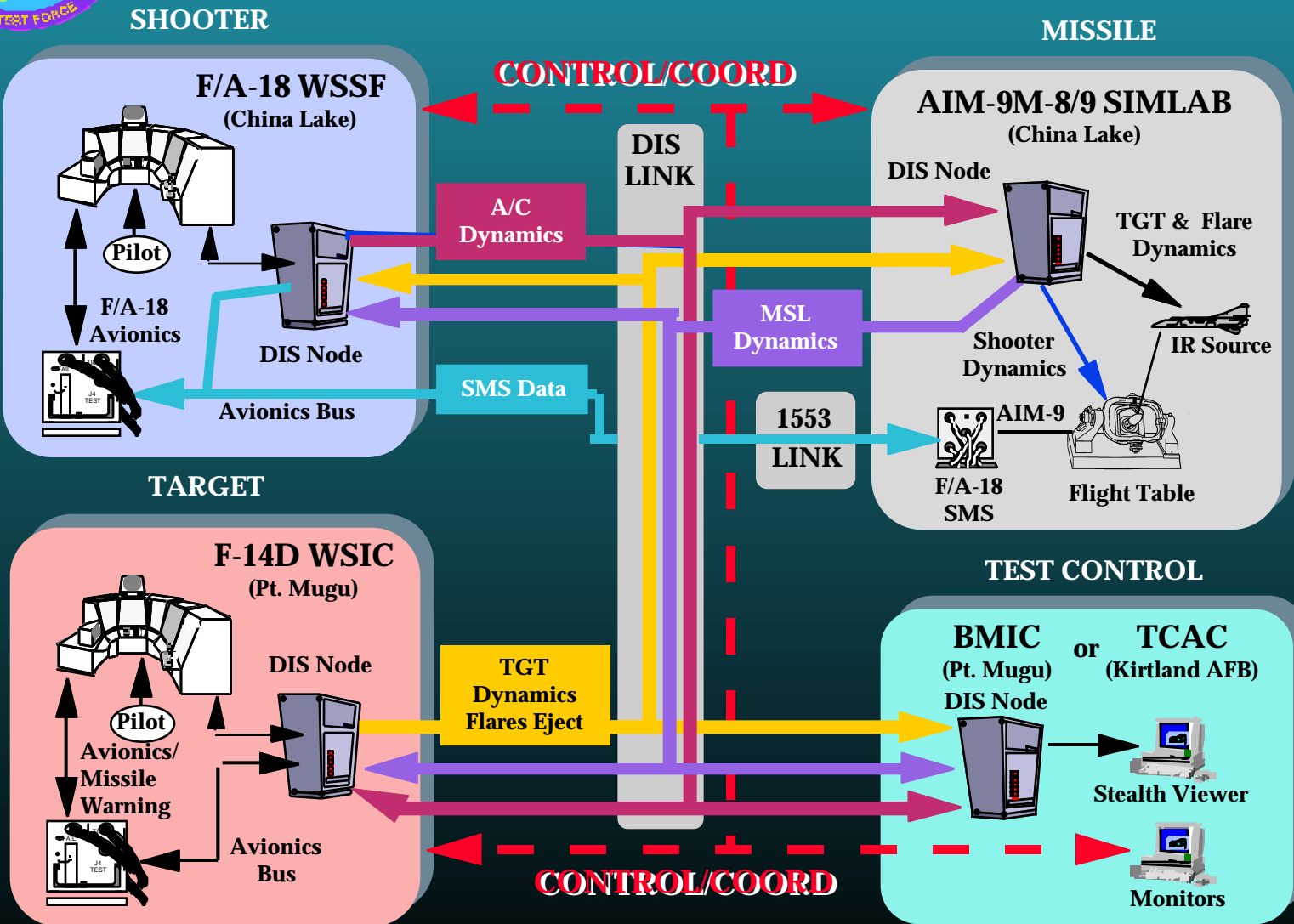


SIT Engagement Scenario





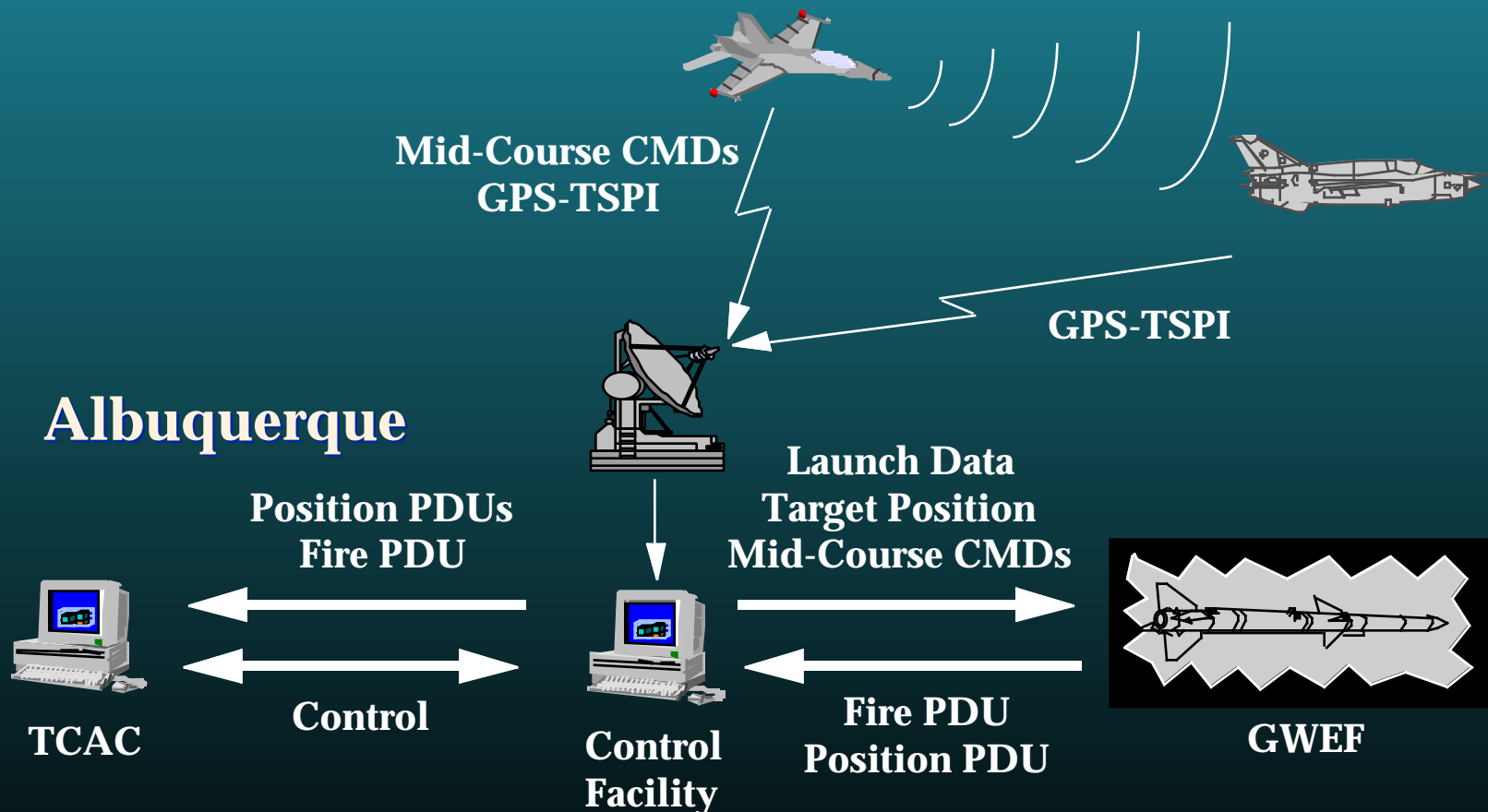
LSP ADS Configuration





Live Fly ADS Configuration

Eglin AFB





SIT Legacy

❑ More realistic testing of missile vs manned target

- Linked Sims: Reactive HWIL scenarios
- Live Fly: Real fire control messages to HWIL missile
- Live Fly: Linked ECM using HWIL anechoic chamber

❑ More cost-effective testing

- Both phases allow more thorough evaluation
- Live Fly: Multiple passes per range mission
- Live Fly: Modification of passes during mission

❑ Follow-on activities inspired by SIT LSP

- Synthetic Test & Training Range Link (Ft Hueneme - Pt Mugu)
- Pt Mugu AMRAAM link with China Lake WSSF
- Joint Battlespace Environment (JOBE)



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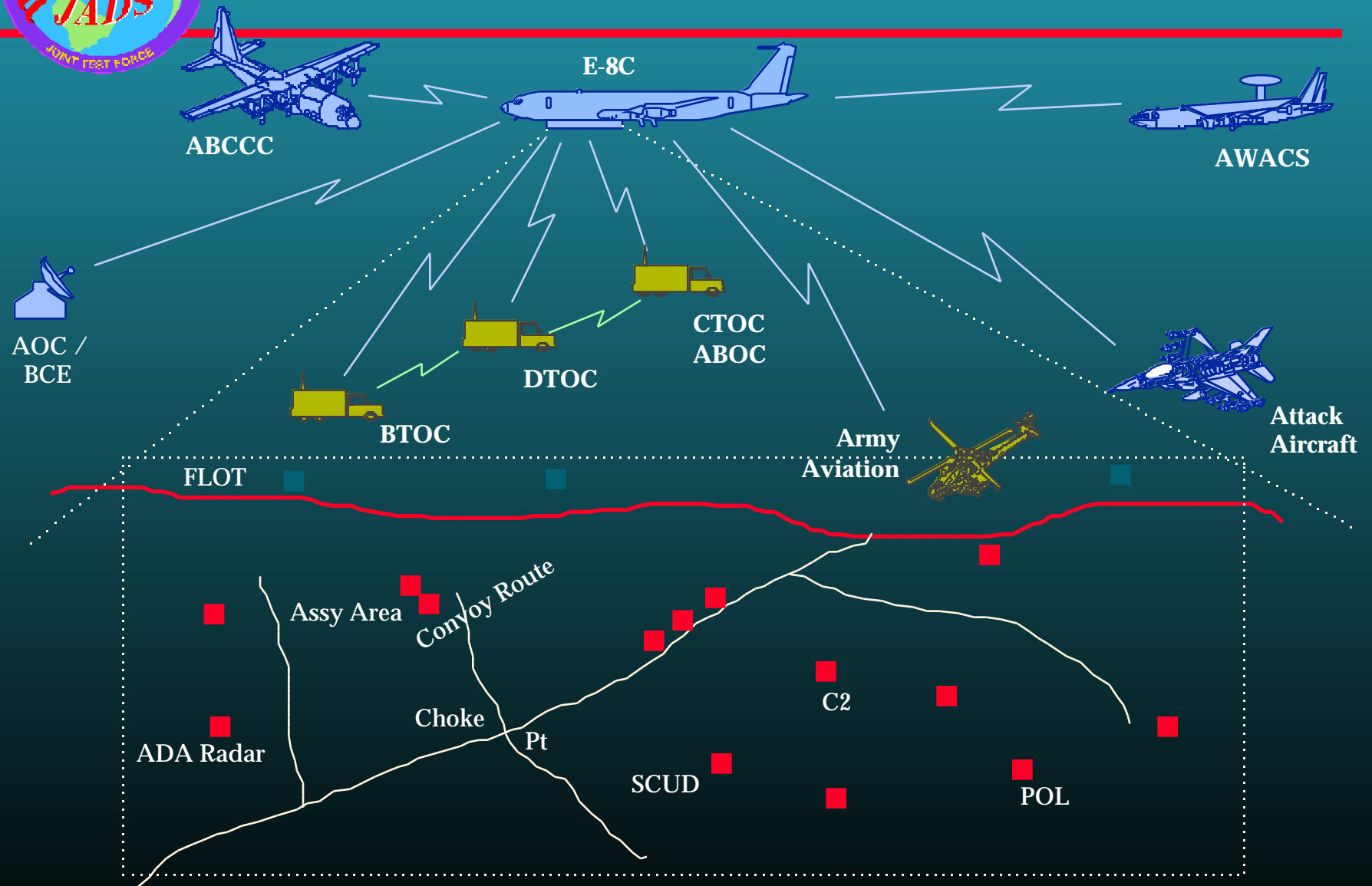


End-to-End Test (ETE)

- ❑ **Purpose:** Examine the utility of ADS in C4I testing.
- ❑ **Method:** Introduce ADS into Developmental and Operational Testing and Evaluation of a System Under Test -- Joint STARS.
 - Develop interfaces between live Joint STARS environment and ETE virtual environment.
 - Conduct ADS-augmented test of Joint STARS and validate results against a baselined conventional test.
 - Evaluate the utility of using ADS in support of DT&E and OT&E on C4I systems.

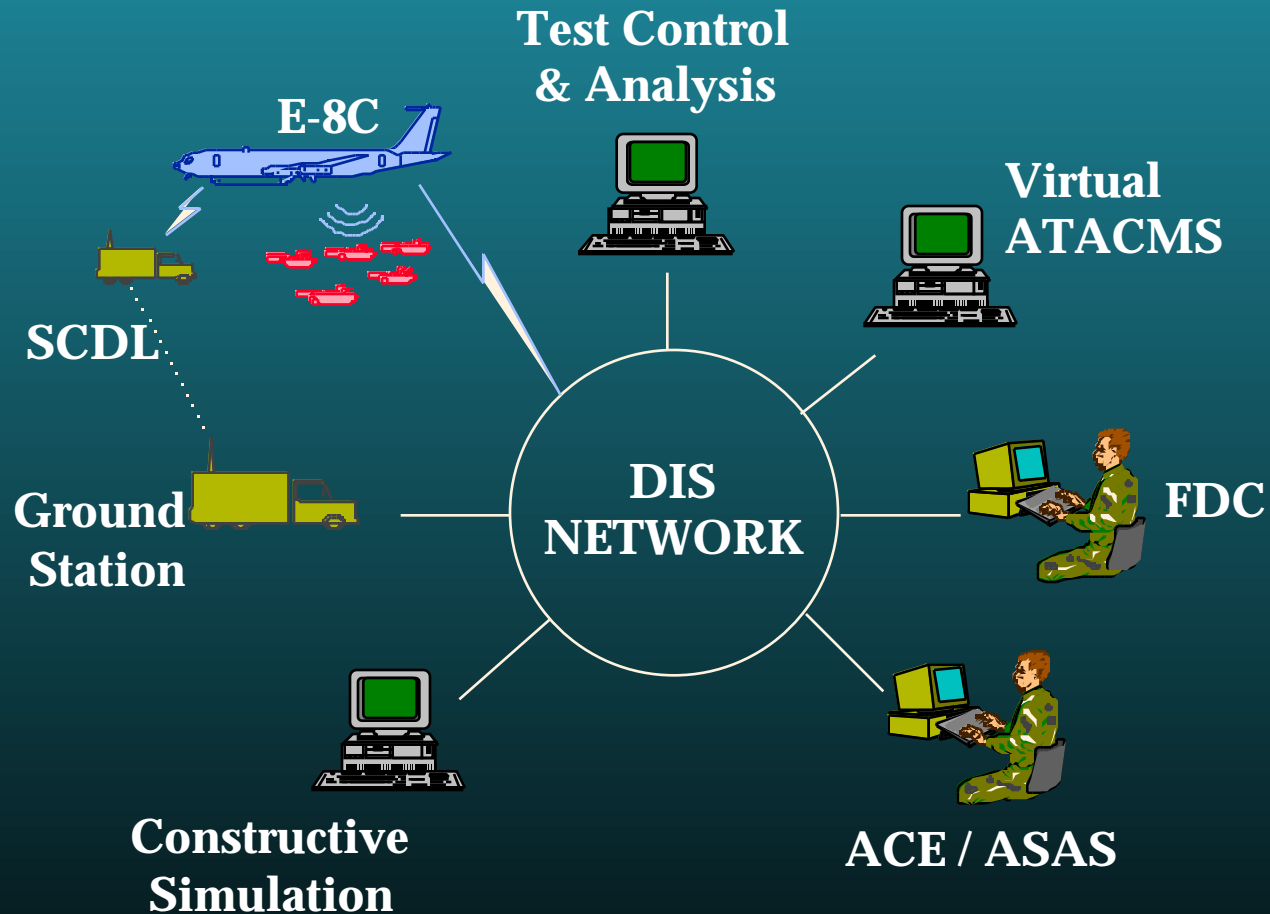


Joint STARS Environment





End-to-End Concept





ETE vs Original MOT&E

Conventional Test

- NTC OPFOR
- enemy rear = southern California highway traffic
- no radar feedback on results of attack
- replicability is difficult
- locations in enemy rear are unknown

JADS ETE Test

- > 8000 vehicles
- enemy rear = certified scenario
- vehicles destroyed, convoys scattered
- repeatable
- 'ground truth' is known



ETE Legacy

❑ T&E Community

- Repeatable test environment
- Flexible test scenarios
- Architecture for future testing
 - E-8C FOT&E
 - ATACMS Block II

❑ Joint STARS

- Long-haul SCDL link
- Full system rehearsal tool

❑ Training & Simulation Community

- Janus 6K Scenario Driver
- Interoperable V&Vd Joint STARS Simulation



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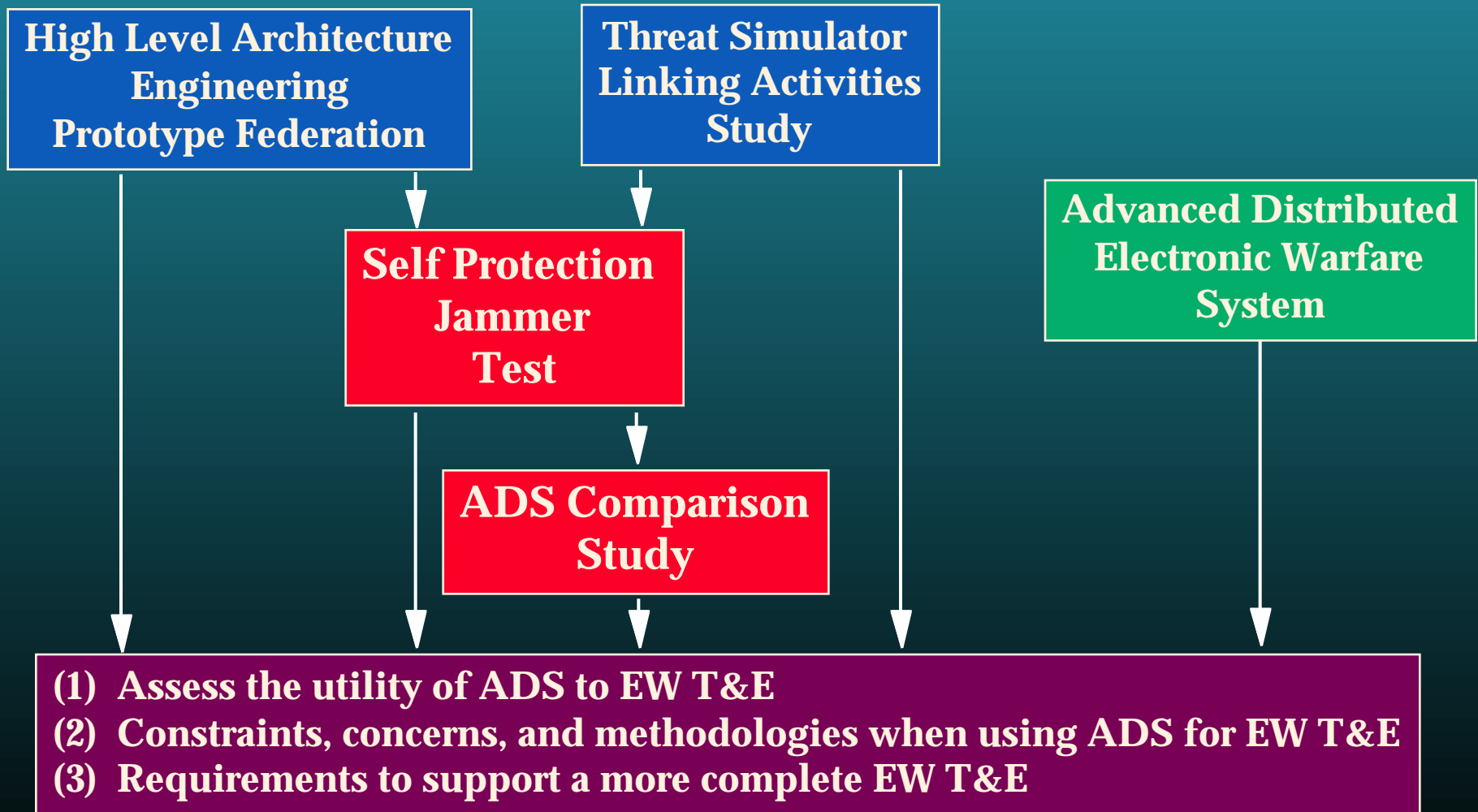
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JADS EW Test Concept Multivectorored Approach





Self Protection Jammer (SPJ) Test

- ❑ Purpose: Assess the utility of ADS for EW by testing the effectiveness of a self protection jammer in an ADS test environment
- ❑ Primary Objective: Determine if valid test results can be obtained in an ADS test environment
- ❑ Bottom Line: SPJ test lays the foundation for the utilization of ADS as a tool for the EW test process



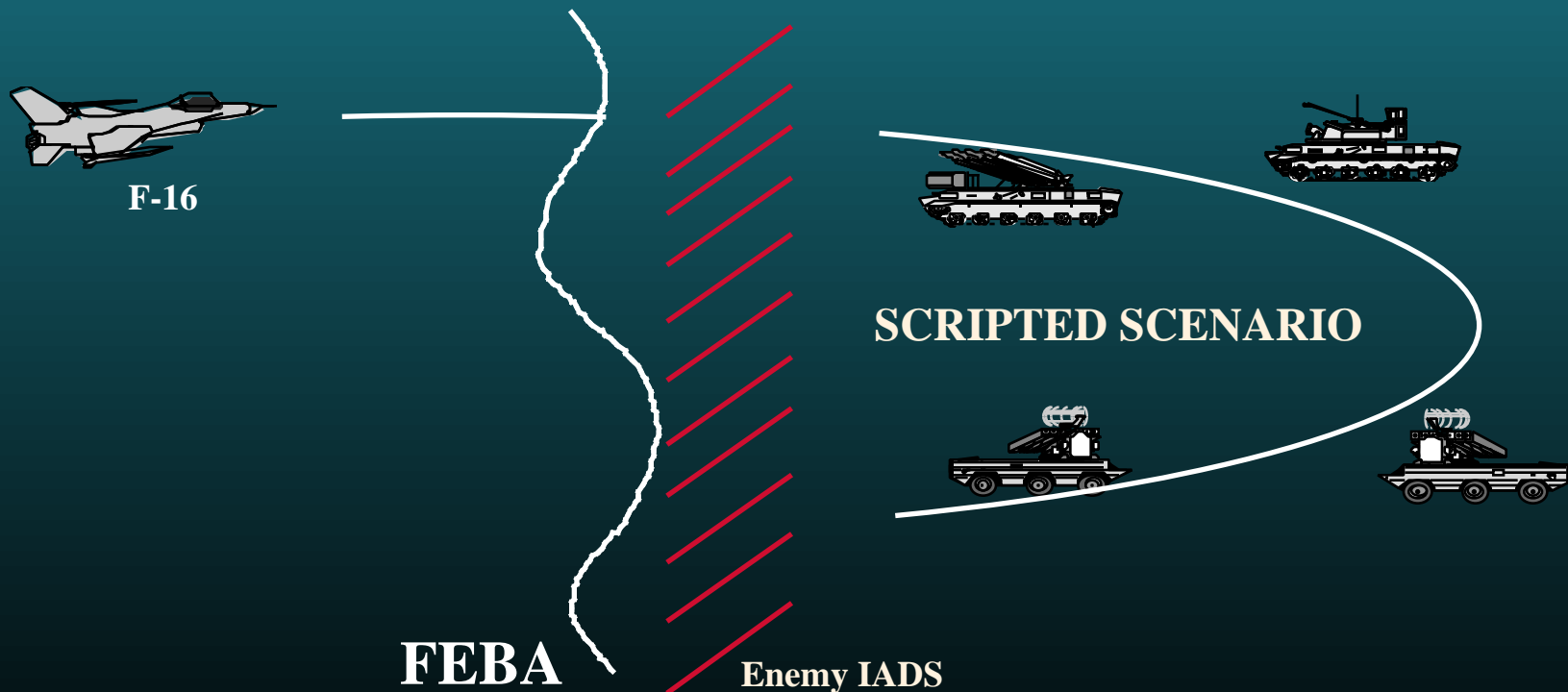
SPJ Test Methodology

- 1. Establish an Open Air Range test environment**
- 2. Evaluate SPJ in the Open Air Range environment**
 - Flight test in a non-ADS test environment
 - Establish baseline performance data
- 3. Replicate Open Air Range environment using ADS**
 - HLA compliant environment
 - Combination of constructive, virtual & live players
- 4. Evaluate the SPJ in the ADS environment**
 - Digital system configuration
 - Installed system configuration
- 5. Compare results**
 - Correlation of test results between environments



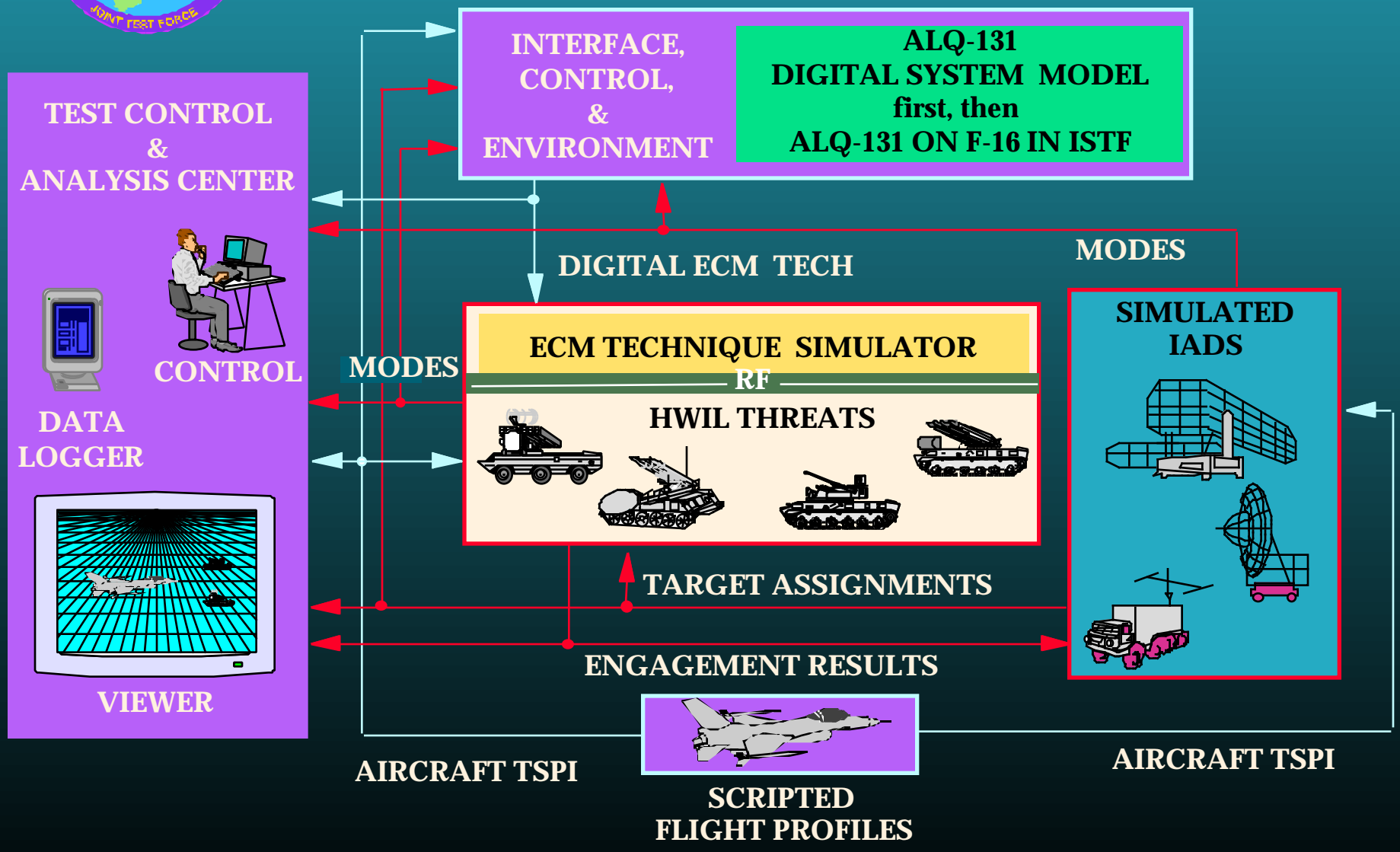
SPJ Test Scenario

- Jun 94 Senior Advisory Council direction
 - Focus on airborne self protection jammer (SPJ)
 - Penetrating strike aircraft crossing a FEBA
 - Linking test facilities and ranges





SPJ Test Configuration





EW Legacy

- ❑ **Determines validity of ADS test results**
- ❑ **Prototypes a real-time digital system model**
 - Proof that a real-time DSM can be developed & linked
 - Earlier effectiveness testing at higher fidelity
- ❑ **Increases capabilities at installed system test facilities**
 - Closed loop effectiveness testing of installed systems
 - High fidelity flight test planning and rehearsal capability
- ❑ **Evaluates an EW ADS test architecture**
 - Implementation of TSLA and HLA
 - Increased instrumentation capability at key facilities
 - Demonstrated real-time automated data reduction, analysis, and display software



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“Other ADS” Activities

- ❑ Leverage off other programs using ADS to help broaden conclusions on ADS utility for T&E**
 - Anti-Armor Advanced Technology Demonstration**
 - Advanced Distributed Electronic Warfare System**
 - HLA Engineering Protofederation**
 - Threat Simulator Linking Architecture**
 - Bradley M2A3 Side-by-Side Analysis**
 - Joint Theater Missile Defense - Attack Operations JT&E**
 - Joint Combat Search and Rescue JT&E**
 - Joint Electronic Combat Simulation JT&E**



Simulation Interoperability Standards Organization (SISO)

- ❑ **Purpose:** Influence growth of interoperability standards to enhance ADS T&E capabilities
- ❑ **Examples:**
 - T&E Focus Group in DIS Workshops
 - User Forums in Simulator Interoperability Workshops
 - Leadership roles to positively shape ADS growth



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Legacy - A Partial List

❑ Individual test legacies

- Leaves knowledge, methodologies, capability at most of DOD's major test centers

❑ JADS-level initiatives

- T&E community sensitized & educated
- Developed ADS applications
 - Articulated plan on where to use/not use ADS
- Training modules
- Recommendations on ADS VV&A
- Recommendations on distributed test control & analysis
- Periodic reports, lessons learned
- Vector for ADS technology growth
- Libraries, data repositories, etc.



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Wrap Up

- ❑ JADS is investigating 3 “slices” of the T&E pie
- ❑ We’re in the early stages of determining where the technology can be used at the required level of rigor for T&E in those 3 “slices”
- ❑ “Other ADS” activities are being searched for and monitored to enhance the JADS lessons learned
- ❑ JADS is producing significant legacy products
 - Broad-based
 - Lasting impact